

THE MOTOR AGE

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LEADING CONTENTS

	PAGE		PAGE
Hewitt-Lindstrom Co.—An illustrated description of the construction of this new firm.	605	Proposed Inter-Ocean Exhibition—Programme of an event being promoted by a newspaper	620
Weekly Patent Office Budget—An illustrated resume of the latest automobile patents.	611	From the Four Winds—News of the motor world gathered from many sources.	623
American DeDion Co.—New firm to make and sell DeDion motors and vehicles	618	News of the Motor Industry—An illustrated history of the week among the makers.	625

HEWITT-LINDSTROM MOTOR CO.

Among the companies that have been carrying on experiments in the motor-vehicle business persistently but unostentatiously, is the Hewitt-Lindstrom Motor Co. of 75 North Clinton Street, Chicago. John Hewitt, the president and treasurer of the company, is at the head of the mammoth Miehle printing press company, a concern which is known wherever the art preservative is practiced. Charles A. Lindstrom is secretary and general manager, as well as mechanical genius of the institution. He was born in Sweden, and, after holding responsible government positions, while

scarcely beyond his majority, he migrated to America where he has been a resident for the past twenty years. After filling several positions of responsibility among the leading firms of the country and receiving a thorough electrical education at the hands of James Blake Cahoon, he turned his attention to the automobile business.

He became imbued with the idea that the constructors of electric vehicles were allowing themselves to be too much hampered in their work by limitations which should not be allowed to be considered germane to the automobile busi-

ness, to wit, the charging of the batteries from the ordinary 110 volt circuits which are commonly used for electric lighting purposes.

Working on the well understood fact that a single cell will develop an average electromotive force of two volts and that batteries are ordinarily limited to forty or forty-four cells—so that they

consume thirty-five amperes, while a battery giving an average voltage of 120 would consume but twenty-five amperes, for the same work. This would give a consumption of practically the same number of watts. But, as the voltage of a battery depends on the number, and not the size, of the cells, while the amperage depends on the size, and, as the



FIG. 1.—HEWITT-LINDSTROM ELECTRIC OMNIBUS.

may be easily charged from an ordinary electric light circuit—he found that the current derived from such a battery consumed an unwarranted amperage but that batteries containing a larger number of cells and giving a higher voltage would work on a much smaller amperage. For instance, a battery giving an average voltage of eighty-eight, would

voltage is the practically constant quantity, it appeared, that, by increasing the number of cells and decreasing their size, it would be possible to construct a battery of sixty small cells which would give a mileage capacity of more than a third greater than that of a battery of forty-four large cells of an equal weight.

Mr. Lindstrom then turned his atten-

tion to the motors, believing that motors for vehicle use could be constructed which would prove more efficient than those now in use. To this end he has embodied a number of improvements, notable among which is the reduction of the air gap between the armature and the field magnets, the space being less than 3-64 of an inch. This, with a number of other points of superiority in the motor, makes it very efficient, and, com-

private use, the batteries have an electromotive force of 104 and an area of travel in excess of fifty miles. One of these vehicles has been in use in Chicago, in the hands of a private user to whose order it was built, for nearly a year and during that time has given the very best of service and has shown no appreciable deterioration. The use of these batteries of high potential necessitates the use of a "motor-generator"—akin to



FIG. 2.—HEWITT-LINDSTROM ELECTRIC STANHOPE.

bined with the added efficiency of the high-pressure batteries, gives a very large mileage capacity to the vehicles.

The accompanying cut, Fig. 1, is of an omnibus which has a seating capacity of from eighteen to twenty persons, which is fitted with one of these 120-volt batteries, and, at its maximum speed of nine miles an hour, consumes twenty-five amperes of current. This vehicle weighs 5,400 pounds, has an area of travel of fifty-six miles, and will climb a sixteen per cent grade.

In vehicles of less weight, designed for

a "booster"—for the purpose of increasing the potential of the current. The cost of this electrical machine is not great and Mr. Lindstrom expressed the belief that purchasers would prefer to stand this additional expense rather than put up with vehicles of small mileage capacity and to pay for repairing motors and batteries of low voltage.

Mr. Lindstrom has for a long time realized that to successfully obtain good service from electric vehicles, besides a highly efficient motor and battery, with high potential, it is of the utmost neces-

sity to have a perfect motor suspension and a flexible perch or reach. Therefore, his first object was to provide a simple and economically constructed running gear, in which the utmost freedom or play of the several parts might be obtained, in such a manner as to obviate or minimize many of the disagreeable



Fig. 3.—Hewitt-Lindstrom Electric rake.

jars and shocks incident to vehicles of ordinary construction. To accomplish his object the front and rear axles of the vehicles are connected by two bars or "reaches," as shown in Fig. 5, each of which has such a connection to the rear axle so as to swing vertically thereon, each rear bar also having a separate universal connection with the forward axle. These reaches are also connected between the axles by a pivoted bar, and altogether the construction is such that while the reaches substantially maintain the alignment between the front and rear axles, they will, nevertheless, permit the axles to independently oscillate or to vibrate vertically relative to each other with such freedom that the gear readily accommodates itself to rough roads without disagreeable jars or shocks, which is a point of great importance where the motor is suspended on the running gear.

The second object is to provide a support for the motors, more particularly of an electric vehicle, which will sustain each motor in its proper relative position with the driving wheels of the vehicle, and will prevent longitudinal or lateral displacement of the motors, and will also

cushion the motor on the running gear in such manner that it will not receive the severe jars or concussions incident to the travel of the vehicle, which, Mr. Lindstrom contends, it would if it were rigidly attached to a rigid frame, and this peculiar suspension of the motors also reduces the shocks incident to the starting of the motors or the application of the brake.

The general manner of mounting the motors is illustrated in Fig. 6, which shows a side elevation of one of the vehicles with parts broken away to show details of construction. This method is better shown, however, in Fig. 7, which shows the manner of mounting the motor and the bracket which is used. This bracket is rotatably hung on the rear axle and is bolted firmly to the motor casing. At the side of the motor casing opposite to that at which the bracket is bolted, there is a shoulder through which passes a bolt, the upper end of which is fastened to one of the reaches. Between this reach and the shoulder on the motor and surrounding the bolt, is a cylindrical rubber spring; and below



Fig. 4.—Hewitt-Lindstrom Electric Delivery Wagon.

the shoulder and the enlarged end of the bolt is another cylindrical rubber spring. These two springs limit the motion of the motor when the vehicle runs over obstructions without giving it a too great latitude for play.

Another feature to which attention was given by Mr. Lindstrom was the

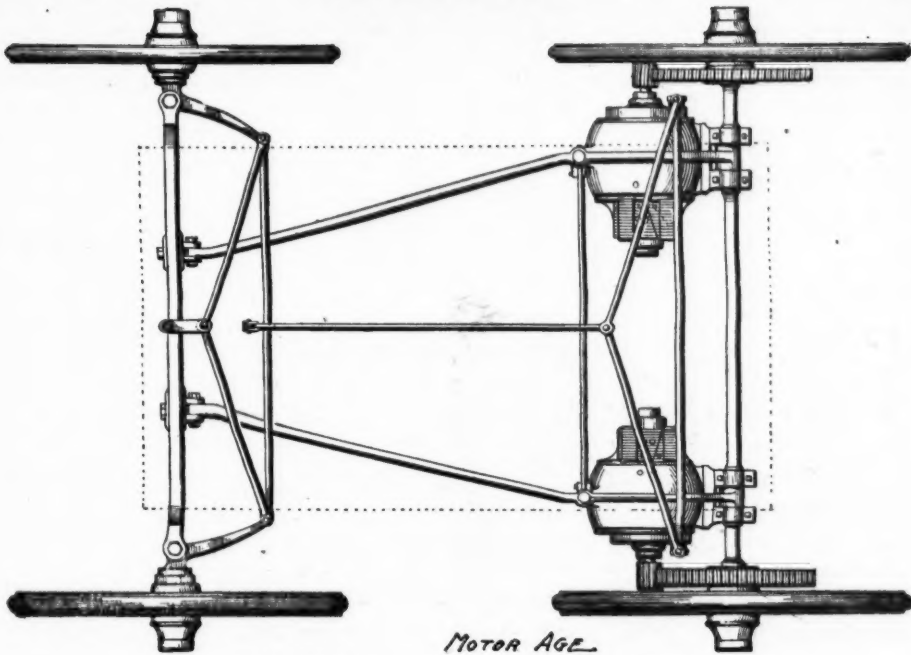


FIG. 5.—PLAN VIEW OF HEWITT-LINDSTROM RUNNING-GEAR.

construction of an efficient motor brake. This is illustrated in Fig. 8, an inspection of which will give an excellent idea of its construction. It is entirely enclosed in the motor casing and is very effective, being, of course, thoroughly

protected from dirt and dust. In addition to the brake shown in the illustration, a second emergency brake is fitted which acts on the outer surface of an internal gear on the omnibus.

The carriages are all provided with a

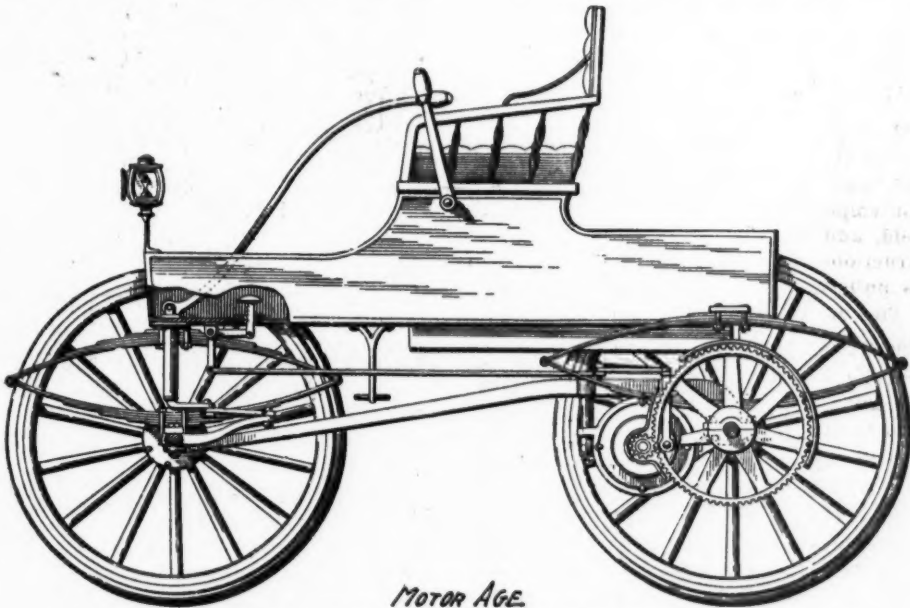


FIG. 6.—SIDE ELEVATION OF HEWITT-LINDSTROM RUNABOUT.

circuit-breaker, which adds to the safety—although the controller is of a most improved type, and is designed especially

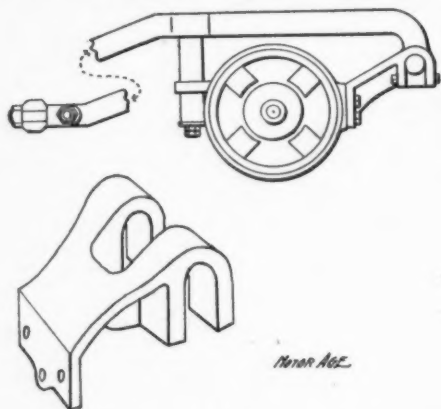


Fig. 7.—Method of Suspending the Hewitt-Lindstrom Electric Motor, with Enlarged View of Bracket.

with a view to preventing heating at contacts or arcing.

The motors are of multipolar type—four poles for small carriages and six for omnibuses—and shop tests have shown ninety-two percent efficiency. The motors are built to stand, for a short time, 100 per cent overload, and, for more than an hour, fifty percent without excessive heating.

Mr. Lindstrom's daughter, thirteen years old, is often seen in the parks operating a Stanhope, as illustrated in Fig. 2, weighing 1,600 pounds. Sixteen miles per hour is the maximum speed.

The company intends to sell licenses to carriage manufacturers or others who contemplate entering the automobile field, and will furnish drawings and instructions regarding motor and batteries as built under their patents.

The company makes the following claims for the vehicles illustrated: The delivery wagons (see Fig. 3) weighs 2,825 pounds, will travel forty-five miles on one charge, will carry a load of 1,500 pounds, and will take a twenty percent

grade. The weight of the brake (see Fig. 4) is 2,500 pounds; it will travel forty miles on a charge, carrying four people, and will take a twenty-two percent grade. The Stanhope weighs 1,600 pounds, travels forty-one miles, seats two people, and will climb a sixteen percent grade.

The omnibus is equipped with two four and one-half horsepower motors. These motors will stand 100 percent overload if necessary, and the bus has a battery capacity of nineteen kilowatts. All carriages designed by Mr. Lindstrom are perfectly noiseless, which is accounted for as follows: 1. Perfect motor suspension. 2 A running gear with a perfectly flexible reach. 3. The construction is skillfully and perfectly performed. 4. The carriages do not get out of order mechanically, owing to the small number of bolts. 5. The motors can not be burned out nor the batteries injured, as special designs have been adopted to prevent this unpleasant possibility.

The first time the omnibus was on the streets was Derby day. Twenty people

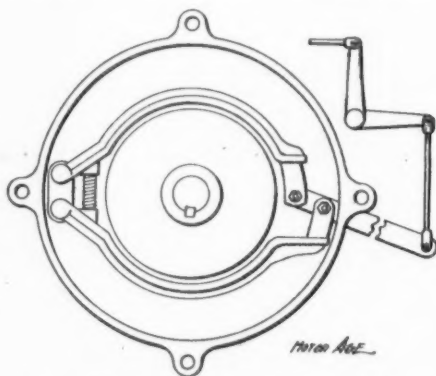


Fig. 8.—Sectional Side View of Hewitt-Lindstrom Motor Brake.

visited the races as the guests of the president of the company. The total mileage that day was thirty-eight, which is remarkable on a first trip.

WEEKLY PATENT OFFICE BUDGET.

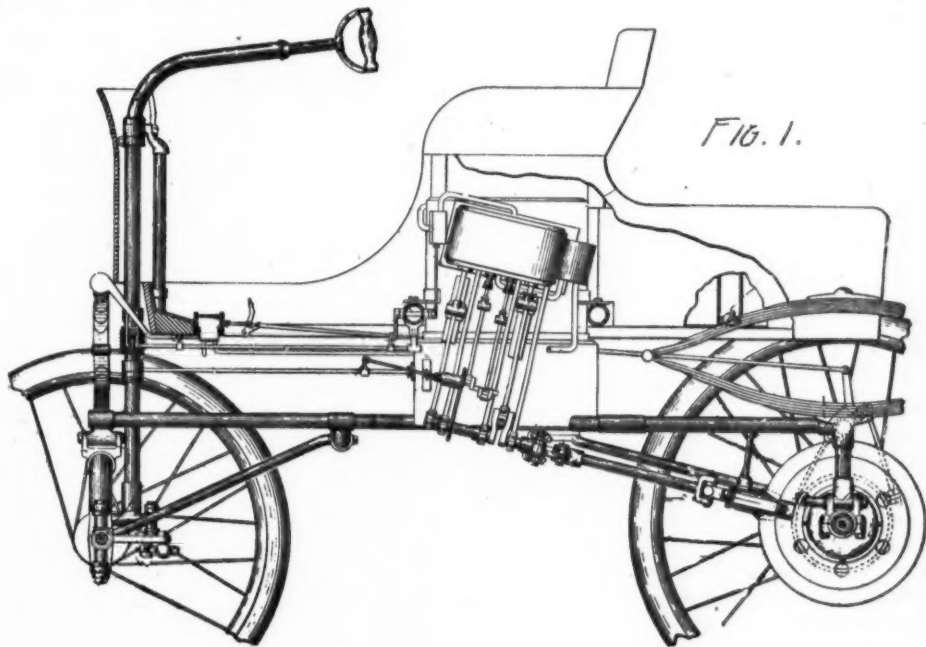
AN INTERESTING LOT OF PATENTS OF WHICH GEORGE E. WHITNEY HAS FIVE CARRYING NO LESS THAN 159 CLAIMS ON STEAM VEHICLE CONSTRUCTION—THE PRODUCTIONS OF OTHER INVENTORS

The budget of patents this week is particularly interesting. The five patents of George E. Whitney, the pioneer in steam vehicle construction, form the most instructive portion of the lot. In treating these five patents of Mr. Whitney it is impossible to touch on all the points that are covered by the 159 claims which they carry. Persons who desire fuller de-

is that noted at the beginning of the description of each patent in *The Motor Age* and the date is nine days earlier than the date of the paper in which the description appears.

WHITNEY'S BUDGET

Letters Patent, Nos. 652,940, 652,941, 652,942, 652,943, and 652,944, to George E.



tails as to the points covered should send to the patent office for the complete specifications.

The complete specifications of any patents, with the drawings, will be furnished by the patent office at Washington for five cents. Persons sending for patents should address their letters "Commissioner of Patents, Washington, D. C.," should enclose five cents for each copy desired, and should give the number and date of the patent. The number

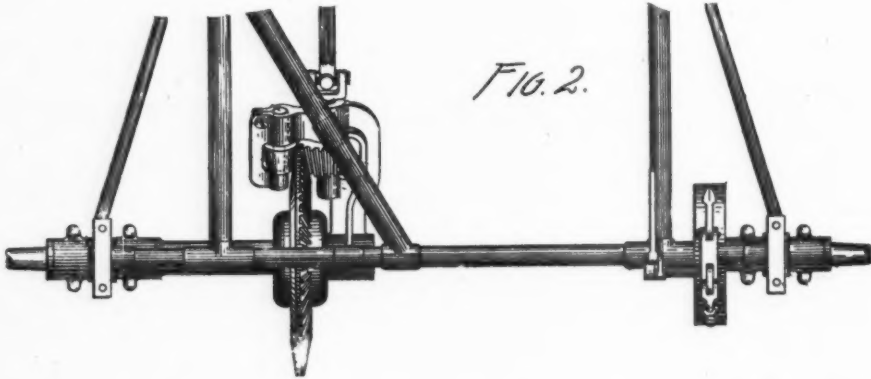
Whitney, Boston, Mass., assignor to the Whitney Motor Wagon Co., same place; transmission gears and controlling devices.

These five patents are so closely connected that it is impossible to describe them individually without covering the same ground more than once, for which reason they are treated collectively. Mr. Whitney bears the distinction of being the pioneer of the latter day constructors of steam motor-vehicles. He has

already secured a number of United States patents covering his inventions, some of which are referred to in the present specifications. These patents are remarkable for the number of claims allowed, the first two each carrying forty-six claims and the five aggregating no less than 159.

In Fig. 1 is shown a side elevation, parts being broken away, of one style of construction covered by Whitney. In this style, the two-cylinder engine is set at such an angle that the motor-shaft extended, would intersect the rear driving axle. This motor shaft is extended far enough so that a bevel pinion on the end thereof engages with a bevel gear

dle. By moving this handle H7 laterally, the vehicle is steered in the usual manner. By twisting the handle to the right or left, the throttle is opened less or more or closed entirely. To transmit this twisting motion through the curved lever, it is necessary to provide some sort of universal connection. One method that Mr. Whitney adopts, is shown in Fig. 4. The connection between the rod H6 and the rod H8 is made by means of four spiral springs, one inside the other. Each alternate spring is coiled in a direction the reverse of the adjacent spring, or springs, with the result that a positive motion is transmitted. If, after the throttle is en-



on the differential gear casing. To maintain these two bevel gears in mesh a roller is provided on a bracket encircling the end of the motor-shaft which carries the bevel pinion, which roller is in contact with the back of the bevel gear on the differential gear case, as shown in Fig. 2, and a distance bar is provided which maintains the motor mechanism at a constant distance from the traction wheel shaft.

In the motor shaft, between the cranks, and the bevel pinion, are two universal joints which permit any latitude of movement between the body and running gear without interfering with the transmission of the power.

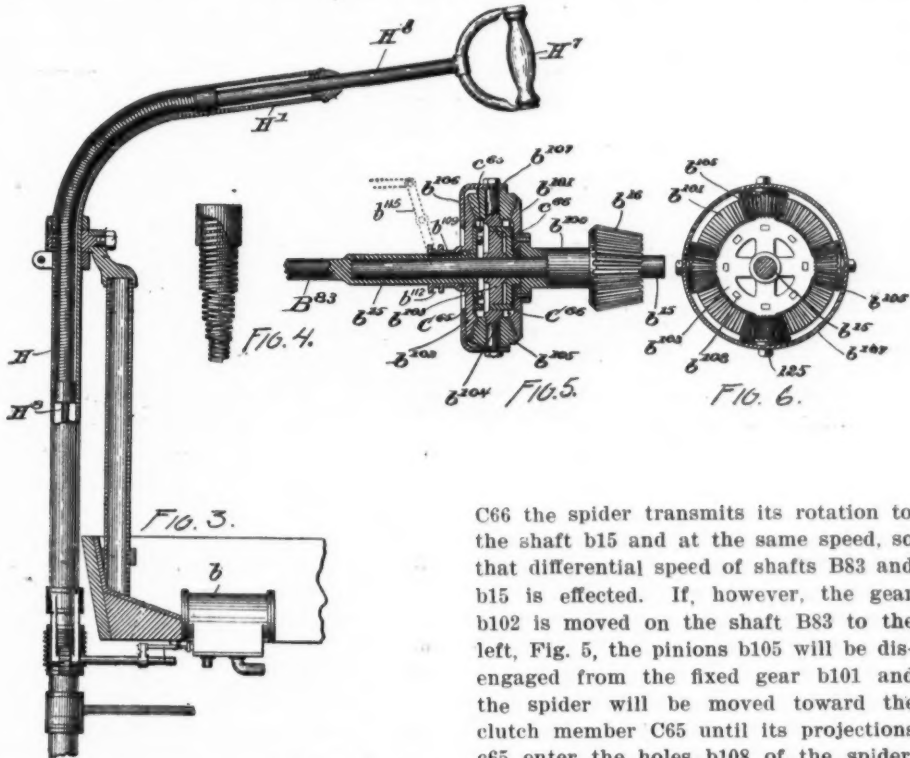
In Fig. 3 is shown one of the numerous forms of controlling lever which Mr. Whitney has covered by patents and for which he is famous. In this figure, H represents the standard and H7 the han-

tirely closed, it is desired to apply the brake, a still further twisting of the handle will open a valve, admitting steam to the chest b, which acts on the brake mechanism. To control the direction of the vehicle, forward or back, the rod H6 is slid forward or back in the head H1 of the steering lever and the link motion is actuated.

In Fig. 5 is shown a sectional side elevation of a speed varying transmission device on the end of the motor shaft, the pinion b16 being the same as shown in Figs. 1 and 2. Fig. 6 shows an elevation of a portion of this device. Referring to Fig. 5, the shaft b15 is shown as passing through a bearing b100 to which a bevel gear b101 is rigidly attached. A similar gear, b102 is keyed to the shaft B83, which latter is shown as cored out to receive the end of the pinion-shaft b15, the shaft B83 being con-

nected to the motor. A spider b103 is rotatably mounted on shaft b15, between the bevel-gears b101 and b102, this spider carrying studs b104, four in number, on each of which is rotatably mounted a bevel-pinion b105. A disk b106, adjacent the back of the gear b102, has an annular flange b107, which passes around the outer ends of the pinions b105, the studs b104 extending through the flange, the latter being secured thereto by bolts 125, so that when the gear b102 is moved

der b103, the holes and the projections on the two clutch members being located in like circles on the respective parts. Now with the parts in the position shown in Fig. 5, rotation of the shaft B83 carries the bevel-gear b102 around with it, causing axial rotation of the pinions b105 on their studs, and, as the fixed bevel-gear b101 meshes with these pinions they will cause the spider b103 to rotate at one-half the speed of the shaft B83. Through the clutch member



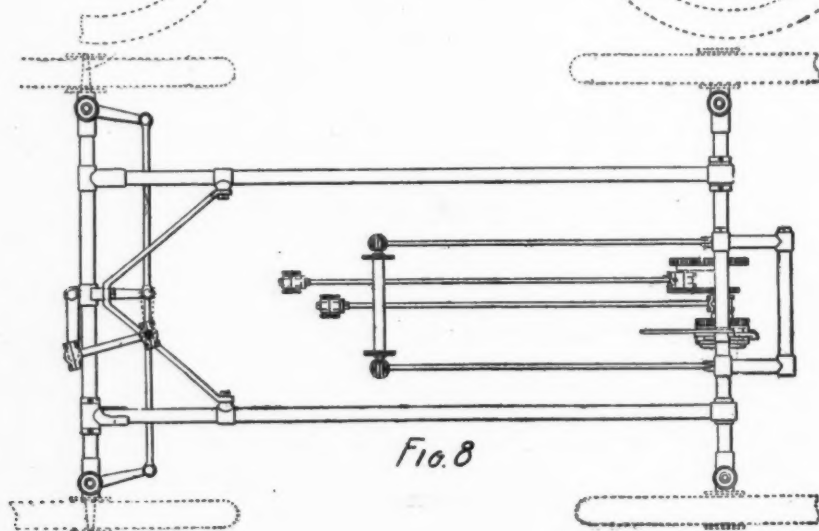
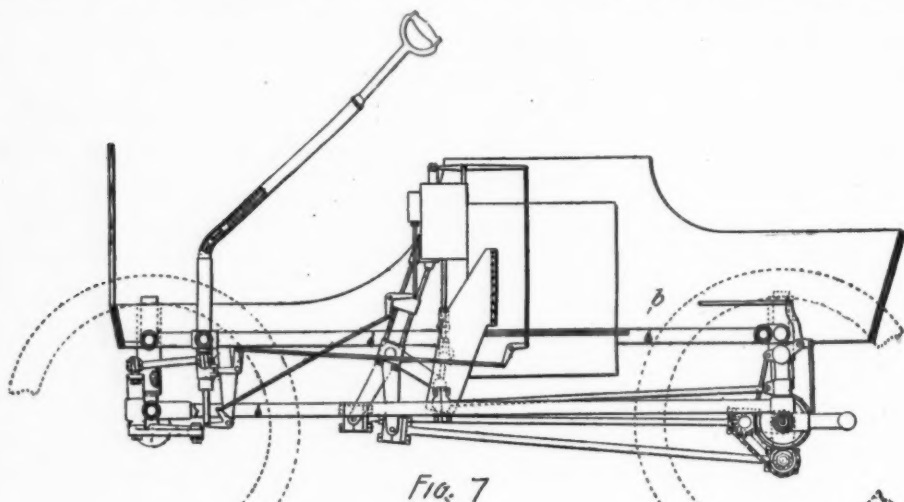
longitudinally on the shaft B83 the disk, spider, and pinions will move in unison therewith. The hub of the bevel-gear b102 is enlarged interiorly to receive the hub of a clutch member C65, surrounding the hollow end of and attached to the shaft B83 in suitable manner to rotate therewith, this clutch member having a series of projections c65 on its inner face. A second clutch member C66 is secured to the shaft b15, between the spider and the gear b101, this clutch having inturned projections c66, which enter corresponding holes b108 in the spi-

C66 the spider transmits its rotation to the shaft b15 and at the same speed, so that differential speed of shafts B83 and b15 is effected. If, however, the gear b102 is moved on the shaft B83 to the left, Fig. 5, the pinions b105 will be disengaged from the fixed gear b101 and the spider will be moved toward the clutch member C65 until its projections c65 enter the holes b108 of the spider. Such movement of the spider will not disconnect it from the clutch member C66 because of the length of the projections c66, and thus the spider acts to connect the two clutch members, and they will rotate together and at the same speed. It therefore follows that the shafts B83 and b15 will rotate together and at the same speed, each clutch member being connected to rotate with its particular clutch member. The hub b109 of the bevel-gear b102 is shown as provided with an annular groove b112 to receive lugs on a controlling-lever, b115.

by which the mechanism may be controlled by the occupant of the vehicle.

Figs. 7 and 8 show a construction in which Mr. Whitney utilizes the differential crank-shaft which was fully described in *The Motor Age* in the issue of Nov. 23, 1899, in connection with a low

cranks and these, in turn, to rods which transmit the motion to the differential cranks on the traction wheel axle. The motor mechanism is maintained at a constant distance from this axle by means of distance bars and motion is permitted between the body which carries the mo-



speed engine. In this device the cranks are mounted on the traction wheel axle and means for differential movement of the two ends of this axle are provided in connection with the cranks. In Fig. 7, which shows a side elevation of a vehicle, parts broken away, the piston rods are shown as being attached to bell

tor mechanism and the running gear, by universal joints in the crank rods, as shown in Fig. 8, which shows a plan view of the vehicle illustrated in Fig. 7. The advantage of this construction, according to Mr. Whitney, is the doing away with a long chain, which, to work smoothly, must run over two sprocket wheels

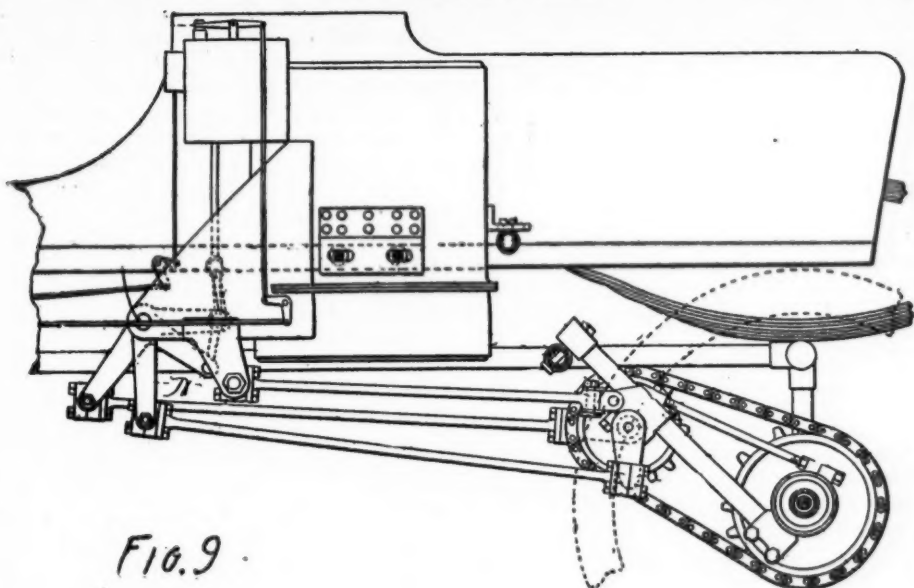
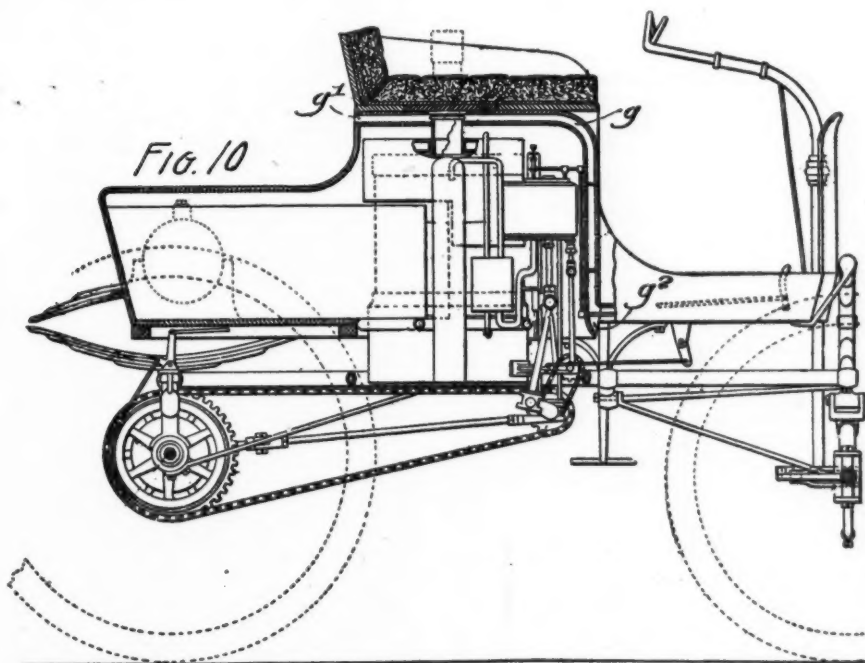


Fig. 9.

which have no lateral motion in reference to each other.

In Fig. 9 is shown another method by which Mr. Whitney avoids the chain difficulty. Here he uses the same bell cranks as in the vehicle just described, but, instead of connecting these bell cranks with rods which actuate a differential

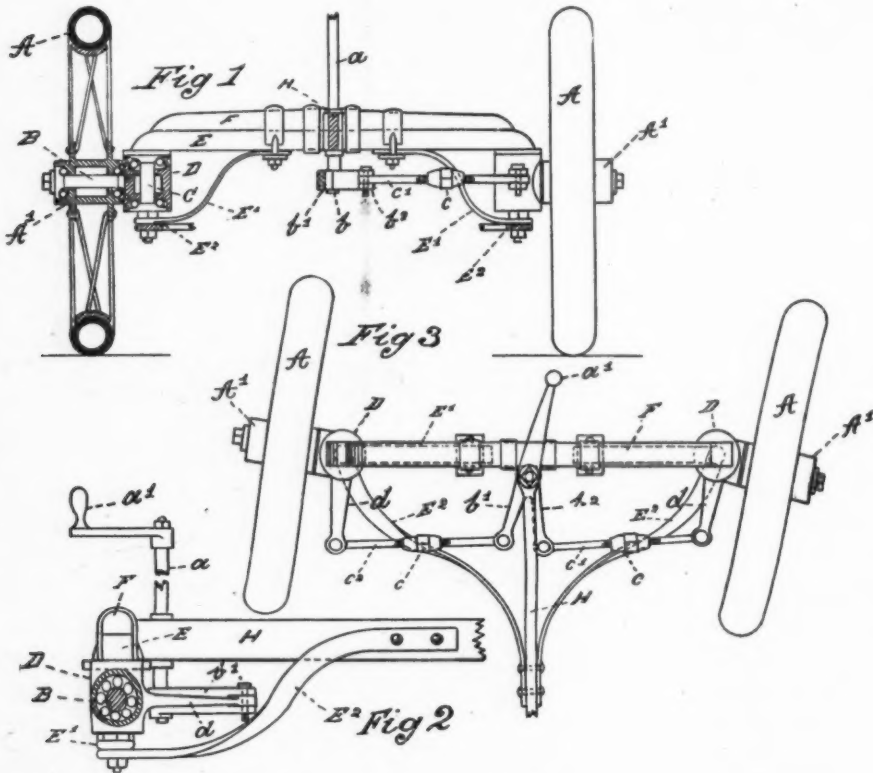
crank-shaft, the rods actuate a countershaft by means of ordinary cranks, and, from this countershaft, power is transmitted to a differential gear on the traction wheel axle by means of sprocket wheels and chains, the countershaft and the traction wheel axle being held rigidly in relation to each other and the con-



necting rods between the countershaft and the bell cranks being provided with universal joints to allow of lateral movement between the body on which is carried the motor mechanism and the running gear.

In Fig. 10 is shown means for preventing the heat of the boiler, etc., from being communicated to the seat of the vehicle, under which it is placed. Two walls are provided between the seat and

steam, it is difficult to get sufficient draft for the proper combustion of the fuel, inasmuch as the exhaust flue for the products of combustion runs downward through the back of the vehicle. To overcome this difficulty, he has an opening in the boiler bonnet. Ordinarily, this opening is closed by a cap, but, when it is desired to get up steam, the upholstered seat is removed, the cap taken off and a telescopic chimney, shown in dot-



QUICK'S RUNNING GEAR.

the boiler mechanism between which is the hollow space *g*. When the vehicle is in motion, the air enters at the flanged opening *g2* and passing up through *g*, escapes at *g1*, thus maintaining a constant circulation of atmospheric air between the seat and the boiler and engine.

In this figure, also, is shown a means for quickly getting up steam. Mr. Whitney says, that, when the vehicle is at rest and an attempt is made to get up

ted lines in Fig. 10, is inserted. This gives the proper draft, and, when steam has been generated, the telescopic chimney is removed, the cap and seat replaced and the products of combustion find an exit below the vehicle, at the rear.

A number of other devices are described and covered in this series of patents, which are worthy of consideration, although the limit on space prevents their description here. Those interested

in the industry will do well to spend the trifling sum necessary to secure the full specifications.

LIBBEY APPEARS AGAIN

Letters Patent, Nos. 652,850 and 652,851, to Hosea W. Libbey, Boston, Mass.; compressed air motor-vehicle.

This inventor, who expects to propel automobiles by allowing the force of compressed air to strike open buckets, has received two adjuncts to his previously described patent, which cover reversible buckets, by the reversal of which the direction of the vehicle is reversed, and other worthless and utterly impractical devices.

QUICK'S RUNNING GEAR

Letters Patent, No. 653,181, to Hiram M. Quick, Paterson, N. J.; automobile steering gear.

The inventor shows a practical and well arranged steering gear in connection with the fore part of the frame of a vehicle, but his attorney has not secured much protection in the one claim that is allowed to the patent. Many other patents have been allowed on devices of a somewhat similar nature.

Fig. 1 shows a front elevation, partially in section of the fore part of the running gear of a vehicle; Fig. 2 a side elevation, partially in section, of one of the steering axles and the steering mechanism and Fig. 3 shows a plan view.

In the drawings, E represents a front axle which is provided with the arms C, F being the bolster of axle and H the reach, E1 being braces secured to the axle and E2 being braces secured to the reach. The braces E1 connect the axle-arms C and the axle E, while the braces E2 connect the axle-arm C and the reach H. The wheel A has a ball-bearing hub A1 and has for its axle the arm B, which is constructed integral with the ball-bearing hub D, which rotates on the angle-arm C or downwardly-projecting portion of the axle E. This ball-bearing hub D is provided with a crank lever d, which is also constructed integral with it. A bifurcated lever b is secured to an upright guide-rod a, which passes pivotally through running-gear

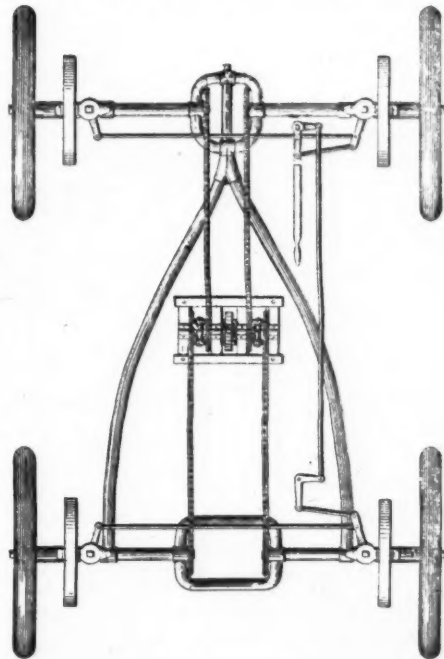
and into the body of vehicle and is provided at the upper end with a steering-handle a1. The bifurcated lever b has the arms right and left, which are indicated as b1 and b2. The ends of arms b1 and b2 are connected with the lever-arms d d by means of the adjusting-rods c1 and c2 and the turnbuckles c c.

In operation, this mechanism gives different angles to each of the steering wheels, when the vehicle is moved out of a straight line.

COTTA'S RUNNING GEAR

Letters Patent No. 652,949, to Charles Cotta, Shannon, Ill.; automobile running gear and transmission device.

This is one of the large number of ingenious and yet impractical devices which weekly pass through the patent office. It is a sample of the frequently seen de-



Cotta's Running Gear.

vices for transmitting the power through all four of the traction wheels, which, it is quite possible, will be a construction largely adopted in the future and it is also a sample of steering by means of all four wheels, which may also be largely adopted.

The plan view of the drawing shows

the general construction. Both the front and rear axles revolve and both are divided and each end of each is driven by a separate sprocket wheel. Each end of each axle is also provided with a stub end by means of a universal joint. The power is transmitted to a gear wheel which is mounted on the casing of a differential gear. On the two ends of the divided shaft of this differential gear are rigidly mounted spindles carrying the pinions of other differential gears. On the larger gear wheels of this differential gears are mounted sprocket wheels, four in all, as shown in the drawing. The right hand pair of sprocket wheels transmits power to the right hand ends of the front and rear axles, the left hand sprocket wheels to the left hand ends of the axles. A single steering lever turns the stub axles of both front and rear wheels at the same time.

It is easy to see why the inventor should desire to provide differentiation between the wheels on either side of the vehicle, but why he should desire differentiation between the front and rear wheel on the same side of the vehicle, is hard to see, as the two will travel at the same rate of speed, being shown as of

the same size. If they were of different sizes, the sprocket wheels should be of such sizes as to make them cover the same distance.

Three claims are allowed.

LEIB'S FLEXIBLE GEAR WHEELS

Letters Patent, No. 653,102, to Charles A. Leib, New York City, flexible gear wheel connection.

This invention provides means whereby the pinion of a motor-shaft—presumably electric—is maintained in constant mesh with an annular flanged gear wheel on the driving wheel of a vehicle. By way of introductory, the inventor says, that, in motor vehicles where the power is transmitted direct to the traction wheels, when lateral vibration is permitted, the gear wheels bind and interfere with the economical transmission of power. To overcome any loss in this direction, he mounts the annular toothed ring on the traction wheel by means of leather or some other flexible substance, claiming that the alleged difficulties will thus be overcome. This device can hardly be considered practical. Three claims are allowed.

AMERICAN DE DION COMPANY

New York, July 9.—With the return of C. J. Field from abroad comes the announcement that an American company with large capital and ample facilities will have the complete United States business of the De Dion-Bouton Co. of France for their motors and "motorettes," as the new company designates their light vehicles, corresponding to the French "voiturettes."

The new company will be known as the De Dion-Bouton Motorette Co., and will have its offices and factory in New York. They will immediately put on the market motors, motorcycles and motorettes of the type of the French De Dion-Bouton,

with some modifications in details to suit American demands.

"The hydro-carbon, or gasolene system of motor-vehicles," said Mr. Field to a Motor Age representative, "has been handicapped before the American public, inasmuch as the most successful type of motors and motor vehicles has not been presented to them—motors and vehicles which have proven so successful in the hands of the public abroad—and we feel assured that, with the introduction of the De Dion-Bouton types to the American public, by a large company, with ample manufacturing facilities, located right in New York, that this sys-

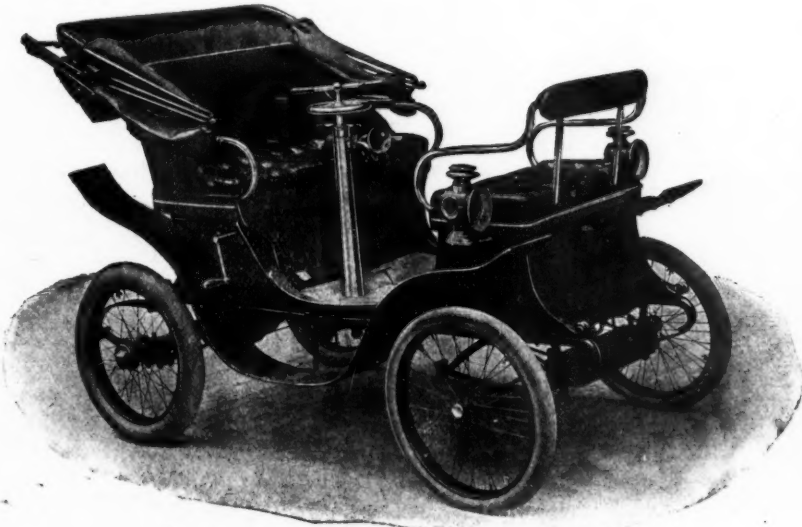
tem cannot help but take the front rank with the American public, as it has done in England, France and Germany. It has demonstrated its success in Europe and the motors of this type are used by practically all of the prominent motorcycle and motorette manufacturers of Europe. Over twenty thousand of these motors are in actual use at the present time.

We have every confidence in the ability of the American manufacturers, but when they are starting in a new industry we believe the policy that is be-

vehicles for our requirements, combining simplicity, reliability and light weight with strength and flexibility in every part."

Mr. Field furnished the following details in connection with the business of the new company:

The $2\frac{3}{4}$ -horsepower air-cooled motor of the De Dion make, which is especially adapted and recommended for bicycles, tricycles and quadricycles, weighs, complete, less than sixty pounds. The other two types of motors are especially adapted for light motorettes. One has an air-



DE DION-BOUTON MOTORETTE.

ing pursued by the De Dion-Bouton Motorette Co., of securing the benefit and experience of the past five years of the largest company in the manufacture of light motors and motorettes abroad, is the only logical and commercial manner of taking up the business—starting off with a demonstrated successful type, and going ahead from this point.

"No doubt there are a number of the heavier types of motor-vehicles abroad which will not become popular with the American public, but this cannot be said of the lighter type of motors and motorettes of the De Dion-Bouton manufacture. They appeal more directly and fully to the American as an ideal type of motor-

cooled cylinder and water-jacketed head of about three horsepower capacity, and the other has a water-jacketed cylinder of $3\frac{1}{2}$ horsepower, and weighs about ninety-five pounds.

These latter are the types which are used to operate the motorettes. This motorette has a comfortable seating capacity for three persons, and weighs less than 700 pounds, and will operate over any ordinary road and up any hill where horse-drawn vehicles can go, carrying its full load. The motorette is geared to operate at a speed from five to twenty-five miles per hour.

The company have secured large buildings at Church Lane and Thirty-seventh

street, within thirty minutes of the Battery or the Brooklyn Bridge, for their general offices and factory location, with plenty of good roads all around to give a practical demonstration of the operation of their motorcycles and motorettes.

Manufacturers and intending purchasers of vehicles or motors are invited to make a personal visit and inspection, and take a ride in some of their latest types which Mr. Field has just brought back with him from Paris, and which are duplicates of the ones the company will soon be turning out.

The Motorette company propose to take up energetically the pushing of the motors on the same broad policy as that of the De Dion-Bouton Co. abroad, in furnishing these motors to the motor-vehicle and carriage trade for use on their make of vehicles, and to assist such

manufacturers with all the technical information and assistance which they may desire.

"Manufacturers," said Mr. Field, "will do well to profit in this line by the experience of the largest and most successful manufacturers abroad, and purchase a demonstrated and approved type of motor like the De Dion-Bouton, and then go ahead with the commercial development of their automobile, instead of wasting several years in expensive and uncertain experiments in developing some untried motor."

Mr. Field returned from Paris about a week ago after a month's visit, and has brought back with him everything necessary for the successful organization of the business here, including a large stock of sample motors and motorettes, and all the necessary parts for getting out their first stock of motorettes.

PROPOSED INTER-OCEAN EXHIBITION

Some time ago a Chicago newspaper, the Inter Ocean, announced an outdoor tournament and exhibition at Washington Park—a trotting track—to be run under the auspices of that paper, September 18 to 22.

Rumors have been afloat that the enterprise was, in reality, a venture of one of the big automobile manufacturers and was to be run in its interests, although all vehicles would be on an equal footing ostensibly. Color is lent to these rumors by the fact that the Inter Ocean is a paper having a small circulation as compared with the leading Chicago dailies, and is in a none too flourishing condition, being run, it is said, in the interests of a street railway company. The \$10,000 announced to be offered in prizes and the other \$10,000 which would be required to run the exhibition make it appear improbable that such a newspaper would

undertake the venture for the advertising that could be gotten out of it.

Further, a man connected with the paper stated to a Motor Age representative that the Inter Ocean had an arrangement whereby it was guaranteed against any loss.

In an interview, D. W. Bowles, the business manager of the daily, stated that no manufacturer had any interest in the exhibition, and that it was being promoted solely as an advertisement for his publication.

When pressed to tell in what manner the advertising would be worth the amount at stake he was noncommittal. The Motor Age representative stated that it was the desire of his publication to do justice to the proposed exhibition in print but that he desired to do justice to all manufacturers.

"Well," said Mr. Bowles, "if you are

afraid of putting your foot in it, you had better say nothing at all," and refused to discuss the matter further.

The following is the announcement that has been issued by the Inter Ocean:

On the opening day there will be a general parade of five hundred vehicles, more or less, with standing and moving exhibition when the general public will be allowed to examine the vehicles in and out of the buildings and ride in them in the parks. Prizes will be given to the manufacturer presenting the greatest number of practical designs, and second, to the manufacturer having the greatest number of automobiles in line. A special prize, for the most practical design of wagon for general purposes.

The second day will be the commencement of the tests for general practical utility. All different forms of power will be classed together and vehicles of each different rating of power will be awarded honors and prizes in competition only with vehicles of like size. The vehicles entered for practical utility must be of standard design, construction and equipment as regularly catalogued by each manufacturer for sale. In tests of practical utility, each manufacturer will be allowed to enter three vehicles, as follows:

One vehicle carrying two people, as operated by the owner of the vehicle.

One vehicle carrying four or six people, as operated by owner or servant in livery.

One vehicle as designed for commercial or merchandise delivery purposes, carrying a load of not less than 1,000 pounds with driver, nor more than 2,500 with driver. The award to be in ratio of load and weight of vehicle.

In testing the practical manipulation of vehicles, a series of dummy figures will be introduced on the tracks which shall be constantly shifted, some remaining permanent, as the vehicles pass through them, causing frequent and sudden stops and turnings to show the safety of the vehicles in crowded thoroughfares, and the dexterity which may be attained by any intelligent operator. There will also be provided a section of extremely rough and uneven road with mud and chuck holes, and country road ruts, with logs, stones and obstructions, requiring short stops and turns and including both up and down grades, corresponding to country roads and city streets. These tests will be of inestimable interest and value to intending purchasers.

In these tests the following ratios of points will be established as winning values.

Speed to be determined on a 5-mile run—(See 200-mile race).....	20 points
Elegance of carriage design and practicability	20 points
Best arrangement of brake and control of speed.....	20 points
Best climbing of grades.....	20 points
Best and surest safety device for operating vehicles either on grades or level.....	10 points

Best, simplest and most easily accessible mechanical construction.....10 points

There will be a hill climbing contest, also a contest on an incline and decline grade in which practicability and controllability of vehicle will be demonstrated.

There will be a heavy draft contest, open for all heavy draft motor trucks built for commercial hauling. In this contest the following ratios of points will be established at winning values.

Construction	20 points
Power	20 points
Carrying Capacity	20 points
Design	20 points
Control	20 points

After decisions have been rendered on tests covered by above rulings the prize winners of each class will be allowed open competition on:

Carriage design for general practical utility.....	30 points
Easiest manipulation.....	30 points
Safety and emergency devices.....	20 points
Cost of power per ton mile, (Per ton mile to include complete weight of vehicle and passengers as well as any additional load that may be carried.)	20 points

Cost of electricity to be based at four cents per kilowatt hour.

Cost of gasoline or oil to be based on current market price per gallon.

In entering machines for all tests of a practical nature, manufacturers will be obliged to give the normal rated power of each vehicle, and a special prize will be awarded for the greatest range of useful power obtainable above and below the normal rating.

Without reference to power, one prize will be offered for the most original conception in an automobile as regards modifications and changes in carriage design that will still leave the vehicle acceptable and practical.

Four races will be given as follows in which speed alone will count one hundred points. Each manufacturer to enter two vehicles of such design and equipment as he may select that shall pertain to the class of vehicles manufactured by him.

A race of twenty miles between steam vehicles.

A race of twenty miles between electric vehicles.

A race of twenty miles between gasoline vehicles.

Any disabling of a vehicle during a race will disqualify it for further participation during that race.

The prize winners of each race will then enter into a free-for-all race of forty miles, standing start without aid—speed to count one hundred points.

The time for these races shall all be kept by each mile, and a side prize given to the vehicle making the best single mile at any time during these races. Any two or more vehicles making the same time must run an additional two miles to settle the decision.

There will be a 200-mile free-for-all fast

track race—for owners—for vehicles carrying four grown people and also a 200-mile track race, for vehicles carrying two people.

A very important feature of the exhibit will be a mail race. Four mail boxes will be placed at equidistant points around the race track and ten miles will be run, making forty stops in all, to collect mail. Each driver will be obliged to stop at each mail box, unlock the box and take card from it and lock it again.

The vehicle making the ten miles and forty stops in the shortest space of time will be awarded the first prize, in addition to which the driver of the prize winning vehicle shall receive \$25 for his personal efforts.

A ten-mile practical road race on rough track constructed to represent an average country road will be given for vehicles carrying four people and ten miles for vehicles carrying two people.

An additional prize will also be given for the design of mail wagon which shall be the most practical and best adapted to the collection of mail from street boxes.

A 500-mile smooth track road race, free-for-all, will be run the fourth day commencing at five o'clock in the morning—100 points for speed. While the sweepstakes is in progress, exhibition performances will take place on inner circle.

This will be followed by an automobile transfer express race of five miles, taking swinging bags from suspended hooks at four points around the track without stopping. The man coming in first with twenty of these bags will be awarded first prize. This test will be open to any and all classes of vehicles.

Ladies' day will be full of interest, as ladies will have the tracks exclusively in a series of races which shall be run in regular carriages and not racing vehicles, in addition to which the most dexterous lady operator in dodging dummy figures, climbing grades and general manipulation of the vehicle will receive a special gold medal with the name of the vehicle engraved thereon. Entries may be made either by manufacturers or private owners.

A special gold medal (engraved with the name of the vehicle and operator) will be awarded the operator of vehicles (of the commercial and catalogue type) who performs the most difficult tests and practical movements.

This will be immediately followed by an exhibition of vehicles owned exclusively by private parties which will be open and

free-for-all in a four-mile race. The first prize will go to the winner of the race, the second prize to the most dexterous operator; the third prize to the best appearing vehicle.

This race will be followed by a free-for-all exhibition of fancy or trick driving either by manufacturers, private owners, ladies or gentlemen.

There will also be a pulling contest, free-for-all, of any make, design or capacity of vehicle. Award to be in ratio to weight, power and performance.

To demonstrate the merchandise delivery wagon, a race of three miles will be run, having eight stations on alternate sides of the track at each of which must be left a package weighing not less than twenty pounds. Each wagon will be allowed a driver and assistant, as is the usual practice on such wagons. In this test the wagon shall not be required to come to a full stop, the driver and assistant operating together as best they can, but the winning vehicle must arrive at the finishing point with all packages delivered and the driver and assistant in the respective places.

After the races are over, a grand prize of \$1000 will be offered to the most valuable invention in automobiles that shall have been practically demonstrated during the week of the exhibition.

Among the novel features on daily exhibition—one passenger vehicle will be given an eighth of a mile start of a second vehicle. The second overtaking the first and a complete exchange of baggage, drivers and passengers with vehicles running at full speed. This is considered one of the most difficult feats in automobile driving. The award to go to the vehicles making the exchange while at the highest rate of speed.

This will be immediately followed by a race of automobiles running backwards at full speed for one mile. The latter race will be open to any and all kinds of vehicles.

Ten thousand dollars in prizes are to be awarded in this competition, and are to be apportioned to the events at the time of the final adoption of the Programme, July 15.

Bands of music will be in constant attendance, and superb decorations together with the green and flowers of famous Washington Park will complete a scene of brilliant gaiety.

An exceptionally low transportation rate has been granted this show which guarantees a large attendance from throughout the country.

FROM THE FOUR WINDS

NOTES FROM GERMANY

Berlin, June 24.—Herr von Fischer, a partner in the firm of Benz & Co., died at the beginning of the month. His demise is deeply felt by all who knew him and it is due to him, to a great extent, that the Mannheim company secured their leading position among motor-car manufacturers.

Berlin's permanent automobile exhibition in the Georgen Strasse, organized by County Tollerand-Perigord, will be opened on July 1. Herr G. Freund, who was closely connected with last year's show in the Karl Strasse barracks, has accepted the directorship and is extremely busy with the final preparations. The affair has been turned into a limited liability company.

The Berlin Metropole Theater, a place of entertainment on Unter den Linden, which hovers between very light burlesque acts and the variety stage, has been giving "The Conjuror of the Nile" with great success, ancient Egypt being brought up to date by the inclusion of a handsomely and appropriately decorated motor-car, steered by an Egyptian lady of olden times, at whose side a beautiful princess is seated. The driver is most accomplished and manipulates her car in very business like fashion. What would the sons of Pharaoh say could they get a glimpse of this parody on their life and customs?

Automobilism is to serve humanitarian purposes, for at the suggestion of Professor von Schroeter the Allaud (Austria) Sanatorium have ordered a break of nine-horsepower for the conveyance of patients from Moedling and Baden to Allaud.

A SENSATION IN SYDNEY

Sydney, June 6.—W. J. C. Elliott, proprietor of the Sydney Austral Cycle Agency, landed a beautiful little motor voiturette in Sydney last week, and has been driving around Sydney's streets and

suburbs during the past few days on it, where it has attracted considerable attention. Whenever it comes to a standstill in the streets it is well nigh impossible to get near the vehicle, owing to the vast crowds that congregate to inspect it.

WHERE CAN CHARGING STATIONS BE FOUND?

The Automobile Club of America is desirous of having as complete a list as possible of charging stations throughout the country for publication in its club book, and has asked the Motor Age to publish the following card, which it is most happy to do:

"Information wanted of electric charging stations throughout the country where storage batteries for automobiles can be charged. This information is desired for publication in the Club Book of the Automobile Club of America, about to be issued. Address S. M. Butler, Assistant to the Secretary, 95 Liberty St., New York City."

LYON RETURNS FROM ABROAD

New York, July 9.—Whitney Lyon, who with President Chamberlin founded the Automobile Club of America, has returned from Europe.

He says that while the French turn out the fastest racing machines they pay little attention to aesthetics in their motor-vehicles and they are far behind us in beauty of finish and design. He thinks the British are making the greatest practical progress of all the foreign makers. They are going about automobile manufacture more carefully and systematically than the continental builders and will probably in the end surpass them in the serviceability of their vehicles. Mr. Lyon is enthusiastic on the hospitality extended to the members of the Automobile Club of America.

President Chamberlin is in receipt of an interesting personal letter from A. C.

Bostwick, written as he was about to start for the meeting of the automobile congress. He is much wrought up over the speed trials of W. K. Vanderbilt, Jr., and says when he comes back he would like to run his Panhard against Vanderbilt's Panhard. Mr. Bostwick's Panhard, it will be remembered, is the record breaking racing machine he bought for \$15,000 from Rene de Knyff. Whitney Lyon and D. W. Bishop, by the way, have just bought twelve horsepower Panhards.

What a merry century road race it would be between the Bostwick, Bishop, Lyon, Vanderbilt quartette of Panhards.

RACING IN GERMANY

Berlin, June 24.—Motor-tricycles, Hase-mann, Kaiserslautern first in 3:00:12 2-5; Bockh, Regensburg, second in 3:31:00. Hase-mann, a noted German cycle rider, arrived first in Bamberg.

Racing cars: Schmidt, Mannheim, first in 2:00:00; Baron Scarsebrueck, Hanan, second in 2:09:45. The fastest man in this section was Bender, who, however, punctured and lost a great deal of ground. His time for the distance, after subtracting the period occupied in mending the tire, was 1:38:00.

Touring cars: Enders, Nuremberg, first in 2:41:47 4-5; Barth, Mayence, second in 2:50:56 1-5.

Voiturettes: Wegelin, Augsburg, first in 2:37:00 1-5; Freund, Augsburg, second in 3:06:00.

Little Ehrhard, a ten-year-old lad, came in as sixth "man." This is the fastest race we have had in Germany up to the present, the average distance for the hour being 51.6 kilometers.

Frankfort-on-the-Main is ever ahead in matters related to automobilism and is arranging for a motor race on the track on a very large scale. The Frankfurter Renn Club—a turf club—has offered a silver cup as a first prize and negotiations have been opened with Berlin, Eisenach and Mannheim, which will result in a gathering of our best motorists in Frankfort. It is expected that Messieurs Willey, Tischbein, Fritz Held, Baron Scarisbrueck, Beconnais, Rene de Knyff, Baron Dietrich, Baron Liebig, and other

notables will participate, and if all goes well, July 29 ought to be a red-letter day for racing motorists.

The first French pacing tricycle has made its appearance in Berlin and was ridden round the Friednau track last Thursday evening by Arthur Heimann. It is a long and very wide machine and the water cooling box affords sufficient shelter for the rider to let a small hurricane blow without hurting him much. The man lies directly between the wheels and the immense suction aids his performance to no small degree. No wonder Bauge is able to accomplish such startling performances when paced by a motor-tricycle, and no wonder such cracks as Taylor, Elkes, Walters, smile and shrug their shoulders when Bauge's times and distances are being discussed!

COLUMBUS TO NEW YORK

Cleveland, July 9.—Perry Oakey, a Columbus, Ohio, enthusiast, passed through this city the other day on his way to New York City. He was accompanied by Frank Lapham. The vehicle used was completed a short time ago and was built by Mr. Oakey. No effort will be made to lower records, but they expect to cover about 100 miles a day.

OPEN AIR AUTOMOBILE SHOW

New York, July 9.—E. E. Schwarzkopf, manager of the automobile show and races at the Greater Inter State Fair at Trenton, September 24-29, says that fully two-thirds of the 30,000 square feet set apart in building No. 3 for the motor-vehicle exhibit has been already engaged. No charge is made for spaces for exhibition of automobiles and accessories, but all applications must be filed with M. R. Margerum, secretary Greater Inter State Fair Association, Trenton, N. J., before July 15.

Hitherto bicycle races have been given on Monday, the first day of the fair; but this year a race meet will be run with valuable cash or plate prizes for all classes of automobiles.

The winner of the series will be presented with a handsome silver trophy to be known as the "Inter State Fair Cup."

The entrance fee for each vehicle will be \$10.

Of the races there will be five events in all. The preliminary tests will be for \$100 each, or a plate valued at that sum, and a ten-mile open championship race for a purse of \$200.

Following is the list of the events in contemplation:

First race—Electric, five miles, \$100 plate or cash as desired by winner.

Second race—Gasolene, five miles, \$100

plate or cash as desired by winner.

Third race—Steam, five miles, \$100 plate or cash as desired by winner.

Fourth race—Open championship, ten miles, \$200 plate or cash.

Fifth race—Open only to members of the Automobile Club of America and the Automobile Club of Philadelphia, Pa., ten miles, Inter State Fair Cup.

The fair association will provide for the establishment of a charging station for electric vehicles.

NEWS OF THE MOTOR INDUSTRY

ORIENT MOTOR BICYCLES

The Waltham Mfg. Co. is making motor bicycles.

This does not mean that the officers of the company are merely thinking of making this charming class of conveyance, nor yet that they have merely laid their plans for so doing. It means that the big Waltham factory is busily engaged in their actual manufacture.

This is aside from the company's bicycle business in which it has established a reputation for turning out cycles that are not surpassed in quality—if equaled—by any others, and it is aside from its rapidly increasing business of making motor tricycles and motor quadricycles and motor pacing tandems.

A Motor Age representative called on Manager Gash, of the company, and, in reply to an inquiry as to the truth of the report that the company was preparing to market motor bicycles, he answered:

"Yes, we have decided to do so. For the past year we have been conducting experiments with motor bicycles for general use on the road. Our experiments resulted so satisfactorily that we became satisfied, some time ago, that we could turn out machines that would prove popular, and accordingly have begun work on them—not in an experimental way, for the experimental stage has long since

passed—but in quantities for the public. This action was recently ratified at a meeting of our board of directors and we are now going ahead rapidly.

"No," he continued, in reply to a question, "we are not prepared to say anything in regard to the matter of price just at present. We will build our motor bicycles, as we have all the rest of our product, in a thorough and conscientious manner, so that there can be no complaints as to workmanship or design. It takes some time to turn out goods in this manner, and so it will be about six weeks before our motor bicycles are on the market. We shall say nothing about prices until we are ready to deliver. We have decided that we will place agencies as with our regular bicycles, but only the placing of orders for delivery.

"I am sorry we are not able to give you more information just at present, but the conditions are such that we think it best not to show our hand any further for a few weeks at least. We are devoting all our energies to getting out the first lot and expect to be able to make deliveries soon.

"We shall continue to make the tricycles and quadricycles, and I am glad to say that the demand is steadily increasing, and, I believe, will continue to do so, as a great many people want the three-wheeled vehicle, as it really has many

advantages over the two-wheeled. On the other hand, the motor bicycle will come into much more general use. First, on account of the price, as well as the fact that it is better suited to touring American roads. It will be much lighter, take up much less room, etc.

"Perhaps you will say I am an enthusiast. I admit it. But I firmly believe that if you used a motor bicycle you would be an enthusiast also, and I prophesy that we shall see the day when you are as big a crank over motor cycles as I am, or as you ever were over your old ordinary or safety."

PATENT SUIT IN CLEVELAND

Cleveland, Ohio, July 9.—The Lorain Steel Co., of Lorain, is made defendant in a suit brought against it in this city by the Thompson-Houston Electric Co., of Schenectady, N. Y., and Edward H. Lewis, of Pittsburg. They assert that Rudolph M. Hunter was the inventor of certain parts for electric vehicles for which he applied for a patent. He assigned his rights under the invention to the Thompson-Houston Co. and later made an assignment subject to the first agreement to the General Electric Automobile Co. The company last mentioned assigned the patent right to Mr. Lewis. The Lorain Steel Co. is charged with manufacturing and selling the patented article since December 12, 1899. An accounting and injunction are asked for.

BICYCLE TRUST'S ANNOUNCEMENT

Cleveland, July 9.—H. A. Lozier, Jr., manager of the Lozier sales department of the bicycle trust, is authority for the statement that in the near future his department will announce a line of motor tricycles. The machines are to be built at the Toledo factory and several experimental machines have been completed. They are to be home production throughout and will utilize a gasoline motor designed by George T. Burwell, former superintendent of the Lozier bicycle factory and now superintendent of the Lozier Motor Co., which is preparing to erect a factory in the east. This fact indicates that while the Lozier Motor Co. will

manufacture automobiles, the production of smaller machines of the cycle order will be left to the trust. It is stated that one of the most important improvements shown in the new motor will be a sparking device which will be guaranteed to be absolutely reliable—something entirely new. The machines will be convertible to either tricycles or quadricycles, and while the price has not yet been fully decided upon, it is rumored that it will be about \$350, allowing discounts to dealers.

DESTROYED BY FIRE

Cleveland, July 9.—The branch factory of the Standard Vehicle Co. at Sandusky was entirely destroyed by fire last Friday evening, together with its contents. The loss will reach \$50,000, largely covered by insurance. The headquarters of the company are at Terre Haute, Ind. The concern has become identified with the automobile industry through the manufacture of large numbers of wooden wheels for automobiles. Spontaneous combustion is thought to have been the cause of the fire.

MADISON SQUARE SHOW

New York, July 9.—Official allotment has been made on the main floor of all the spaces save two for the show of the Automobile Club of America, at Madison Square Garden, November 3 to 10. These two will probably be allotted to the Waltham Manufacturing Co. and the American Electric Vehicle Co. A track for moving exhibition purposes encircles the floor and within this are the vehicle exhibits.

On either side of the center aisle are: Winton, Waverley, Stanley, Riker, Locomobile, Electric Vehicle Co. and Automobile Co. of America, of Marion, N. J. On the outer circle of the oval are: Electric Vehicle Co., Daimler, Canda, National Automobile and Electric of Indianapolis, De Dion-Bouton Morette, Le Roche & Co. of New York; United States Automobile Co. of Attleboro, Mass., L. M. Harris, and Foster of Rochester. The American Electric and the Waltham people will also be on the outer circle.

In the north gallery nineteen spaces

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GAS, GASOLENE AND OIL ENGINES, by Gardiner D. Hiscock, M. E. The third edition of this standard work, revised and enlarged; large octavo, 365 pages, 270 illustrations. Price\$2.00

ANY OF ABOVE MAILED POSTPAID ON RECEIPT OF PRICE

THE MOTOR AGE

324 Dearborn Street, CHICAGO

150 Nassau Street, NEW YORK

have been rented to manufacturers of automobile accessories and in the south gallery fourteen trade papers will have booths.

The demand for spaces is so great that the music hall west of the gallery will be divided into stalls for parts and machinery people.

LOZIER TO LOCATE AT PLATTSBURG, N. Y.

Cleveland, July 9.—H. A. Lozier, Jr., stated today that the Lozier Motor Co. of Toledo, of which Mr. Lozier, Sr., is at the head, had decided to accept the proposition made by Plattsburgh, N. Y., business men and will erect its launch and automobile factory in that little city, which is located at the head of Lake Champlain. A new company of large capital is to be organized, of which Mr. Lozier is to control fifty-one per cent of the stock while the other forty-nine percent is to be subscribed by business men of the town. It is stated that \$110,000 has already been subscribed in this way. The plant is to be one of the largest ever built by Mr. Lozier and about \$350,000 is to be expended in plant and equipment. Boats up to 150 feet in length are to be built; the larger boats will be sent around by the way of the St. Lawrence, while the smaller sizes will be shipped by the way of the canal from Lake Champlain to the Hudson. A line of automobiles will be announced by the time the factory is completed.

PROPOSED NEW COMPANY

Sandusky, Ohio, July 9.—Albert N. Merrill, a traveling representative for the Featherstone Sales Department of the bicycle trust, who makes his home in this city, is at present in Toledo consulting with several prominent business men with a view to organizing a company for the sale of motor-vehicles. Mr. Merrill is an enthusiast and has recently invested in a new automobile.

AUTOMOBILES—WHAT ARE THEY?

The special issue of The Motor Age of June 23 contained the only authentic and intelligent description of what automobiles are and what they will do that has ever been published. The subject is treated without the use of technical language and in a

manner that can be understood by persons who have no previous knowledge of the subject. Every chapter is profusely illustrated. The following brief summary of the various chapters will give an excellent idea of the contents:

Introductory

Telling the character and scope of the work and how any desired information can be obtained in the shortest possible time.

The History of the Motor Vehicle

With illustrations of early types of automobiles and group pictures of the various types in use in foreign countries at the present time.

What is Necessary in a Motor Vehicle

This chapter goes into details in a manner that has never before been attempted. The difference between motor-vehicles and horse-drawn vehicles is pointed out and each part of the former, that differs from the latter, is fully described, while numerous illustrations make the text unmistakably clear.

The Three Sources of Power

This chapter describes the advantages and disadvantages arising from the use of electric storage batteries and motors, of steam boilers and engines and of gasoline engines and points out the adaptability of each power for various purposes. Illustrations of the three types of vehicles are given.

Electric Motor-Vehicles

Described in detail, beginning with the construction of the storage battery cell, all without the use of technical terms. Each part described is illustrated, and a skeleton illustration of a complete vehicle given. The chapter ends by telling the care required by electric vehicles.

Steam Motor-Vehicles

Described in detail, beginning with the boiler and engine, showing the various safety devices, all illustrated, with a skeleton view of the complete mechanism of the vehicle. The care of this class of vehicles also receives attention.

Gasoline Motor-Vehicles

The principle of the little understood gasoline motor is carefully explained with the aid of diagrams, the various types described and illustrated and the various adjuncts also described and illustrated. A skeleton view and the care necessary are included.

Motorcycles

Of various kinds are fully described and illustrated.

Motor-Vehicles in Business

Receive a chapter, fully illustrated with the various types in use in both America and foreign countries.

Automobile Racing

Is treated fully in separate chapter which includes illustrations of various machines and racing men.

The Automobile Club of America

Has an illustrated chapter, telling of the scope and earnest endeavors of the body in the cause of automobilism.

Motor-Vehicle Directory

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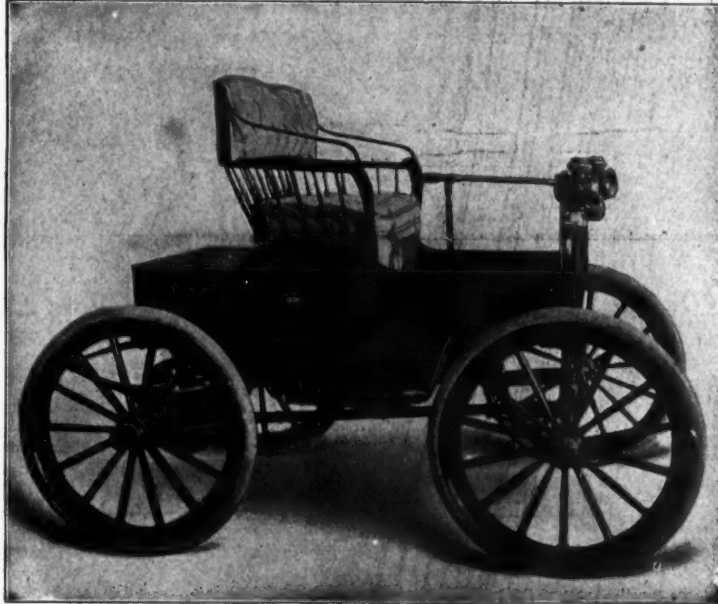
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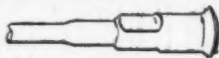
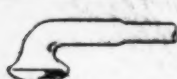
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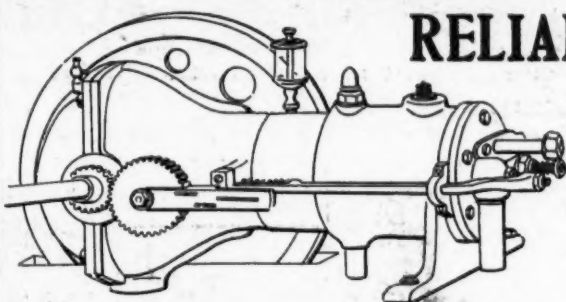
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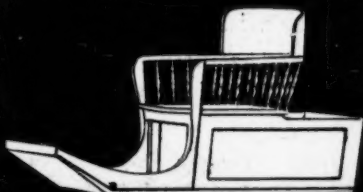
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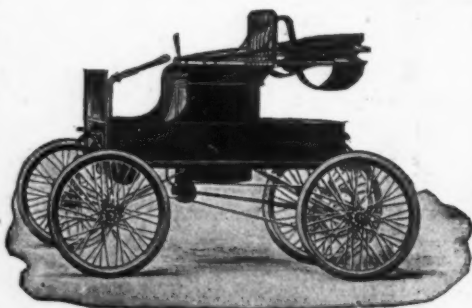
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